OAR goals and actions on PFAS

Briefing for Taylor Hoverman 8/17/20

- **Introduction**
  Karl Moore
- **NDAA Interim Guidance**
  [redacted])
- **Statutory Authorities Relevant to PFAS**
  [redacted])
- **Other Legislative Actions**
  [redacted]
- **Ongoing OAR Activities and Research Needs**
  OAQPS Technical Team
- **PFAS Air-Related Research Budget**
  [redacted]
- **Questions and Next Steps**
  [redacted]
- Appendix

OAR PFAS Related Activities

Under the PFAS Action Plan, OAR coordinates with ORD on the science and, as appropriate, provides assistance to state air agencies. OAR has committed to on-going open communication with ORD, other offices, and Regions/states as the Agency addresses PFAS.

Due to the high priority nature of EPA's cross-agency PFAS response, and the upcoming deadlines for air-related PFAS actions, a small OAR workgroup meets regularly to coordinate OAR PFAS efforts. The main goals of this group is to:

- Coordinate with OAQPS Technical Team (next slide) and OLEM to prepare interim guidance on incineration and disposal per the National Defense Authorization Act (NDAA)
- Manage responses to incoming questions and requests regarding air emissions and transport and engage with interagency PFAS workgroups
- Track progress on PFAS Action Plan, ORD and external academic research on PFAS air emissions, disposal and monitoring
- Over the long term, aid in developing the OAR program for limiting impacts of PFAS air emissions

OAR PFAS Teams

- OAR Coordination Team :
  - (b) (5)
  - (b) (5)
- OAQPS Technical Team:
  - (b) (5)

NDAA Interim Guidance Development

- (b) (5)

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(b) (5) [redacted]

- (b) (5) [redacted]

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(b) (5) [redacted] (cont'd)

- (b) (5) [redacted]

CAA Authorities to Regulate PFAS: Section 112

- Section 112 regulates "Air Toxics"
- Formal listing as a Hazardous Air Pollutant (HAP) required
  - Routes to listing: Petition, with sufficient petitioner's showing or Administrator's determination ("known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects"), or periodically required review (b) (5)
    - Some legislation has called for EPA to list PFAS
    - (b) (5)
  - (b) (5)
- Source category listing required
  - (b) (5)
- Prescriptive standard-setting process
  - For major sources and certain area sources, Section 112 requires application of Maximum Achievable Control Technology ("MACT", the average of the best 12%) and does not allow consideration of cost

CAA Authorities to Regulate PFAS: Section 129

- Section 129 regulates certain "solid waste incineration units"
  - Smaller universe of regulated sources
    - Does not cover incinerators burning hazardous waste
    - Does not cover units regulated under Section 111 or Section 112
  - Incinerators subject to standards promulgated under Section 129 include:
    - Sewage sludge incinerators (SSIs) at wastewater treatment facilities,
    - Commercial and industrial solid waste incinerators (CISWI),
    - Municipal waste combustors (MWCs) and
    - Hospital medical and infectious waste incinerators (HMIWI)
  - Some of these incinerations currently burn PFAS-containing waste
- (b) (5) [redacted]

CAA Authorities to Regulate PFAS: (b) (5)

- (b) (5) [redacted]

Other Legislative Actions

- **PFAS Action Act Passed the House in January**
  - It requires EPA to list PFAS as a HAP under Section 112 no later than 180 days after enactment.
  - Senate leadership is not expected to take up companion legislation in the Senate for the foreseeable future.
  - It was not added to House version of 2021 NADA
  - (b) (5) [redacted]
- **What other legislation has been introduced?**
  - More than 30 pieces of stand-alone PFAS legislation have been introduced. In general, these would amend several environmental statutes and authorize new programs related to PFAS chemicals in four main focal areas:
    - Enhanced detection and research
    - New regulatory mandates
    - Cleanup assistance
    - Exposure to PFAS contamination at or near military installations.
- (b) (5) [redacted]

OAR Information/Data Needs

- The focus on air releases of PFAS compounds and their impact on groundwater is strengthening.
- However, adequate information on sources, measurement methods, control approaches, and deposition is currently lacking.
- R&D activities need to be undertaken or continued to develop the needed information expeditiously. In this context, we support the following activities to address air-related interests:
  A. Development of monitoring approaches for measuring stack and ambient emissions of PFAS. This is needed to characterize PFAS emissions from sources of PFAS and assess efficacy of potential control approaches
  B. Identification of relevant sources and development of information on multi-media releases of PFAS compounds from those sources
  C. Understanding the science associated with PFAS emission control options and developing information on cost-effective mitigation technologies
  D. Risk assessment: Understanding the fate and transport of PFAS air emissions to assess their potential for impacting human health via contaminated groundwater and other media pathways

A. Monitoring Approach Development

- Validated stationary source to assess (OTM 45):
  - Air emissions
  - Destruction, removal, and compliance,
  - Efficacy of destruction and control units
  - Contributions from bottom ash, residuals from control devices
- Validated ambient air methods to monitor:
  - Fate, transport
  - Receptor exposure
  - Fugitive emissions
- Assess real-time continuous PFAS monitoring methods
- Develop total organo-fluorine measurement as a surrogate
- Standardized non-targeted analysis methods to characterize and measure treatment byproducts.

A. Monitoring Approach Development

- Ongoing Assessment (with uncertainties):
  - Incineration studies to characterize thermal treatment efficacy
  - Method evaluation to understand the performance of methods
  - Field tests to understand byproduct/PIC formation
  - Source Characterization to gain knowledge about relevant combustion conditions

B. Sources and Releases

- PFAS can be emitted during manufacture, use, and control
- Manufacturing – Currently no requirements for the manufacture of PFAS
  - (b) (5) [redacted]
- Use - Currently only a single subpart with a limit on PFAS
  - Use of PFOS as a fume suppressant for chromium electroplating
  - (b) (5) [redacted]
- Control - Currently no air regulations for control of PFAS
  - (b) (5) [redacted]
- (b) (5) [redacted]

C. Controls

- Broad focus: Understanding the science associated with control options and developing information on cost-effective control technologies
- ORD PITT
  - Acquire basic and applied data to assess impacts of key parameters on destruction of PFAS and formation of combustion byproducts
  - Field and laboratory Studies (b) (5)
    - Measurement method evaluation
    - Source characterization
- Additional ORD R&D
  - CF_4 surrogate DE evaluation
  - Continuous emission monitors evaluation
  - Total organic fluorine surrogate evaluation
  - Non-targeted measurements
  - Stationary source method draft (OTM-45)
  - PFAS hazard, exposure, risk assessment and prioritization
  - Atmospheric fate, transport and deposition of PFAS

D. Risk Assessment

- Two types of models are used to characterize exposure and risk resulting from air pollution
  - Atmospheric transport and deposition models - characterize air concentrations and deposits of pollutants of interest
  - Multipathway models - help characterize exposure of vulnerable populations via applicable routes
  - Deposition information generated by atmospheric transport and deposition models is used in multipathway models
- Monitoring/Sampling
  - Stack Testing provides emission estimates to support modeling
  - Ambient Air Monitoring provides inhalation exposure
  - Media Sampling (fish, water, soil, etc.) used directly to calculate uptake and ingestion risks

D. Risk Assessment: Atmospheric Transport and Deposition

- PFAS is emitted from facilities into the air, transported and dispersed, and ultimately is deposited on the ground and surface water
  - Dry deposition and wet deposition via precipitation
  - (b) (5) [redacted]
- Once on the ground it can move into groundwater
  - Measurements have shown PFAS in groundwater supplies that are upstream of PFAS-emitting facilities
  - Indicates role of atmospheric transport and deposition
- Presence of PFAS in samples taken in the arctic region indicates long-range transport
- Atmospheric transport and deposition simulated by air quality models
  - Near-field (< 50 km): AMS-EPA Regulatory Model (AERMOD)
    - EPA's preferred near-field model for regulatory applications; EPA's "workhorse" model
  - Near-field and long-range (> 50 km): Community Multiscale Air Quality Model (CMAQ) model
    - Includes atmospheric chemical processes

D. Risk Assessment: Atmospheric Transport and Deposition

- (b) (5) [redacted]
- (b) (5) [redacted]

D. Risk Assessment: Exposure Modeling

- Start with Source Emissions
  - Either monitoring data or emission factors
- Calculate Transport and Dispersion using either AERMOD (near) or CMAQ (far)
  - Dispersion models give ambient air concentrations which lead to inhalation estimate – allows assessment of Inhalation Risks
  - Models calculate wet/dry deposition of PFAS onto sensitive area's such as watersheds, lakes, agriculture
  - Deposition data feeds into Multipathway Models
- Multipathway Models (b) (5) Calculate
  - Fate: impacts of biodegradation/transformation over 50-year cycle
  - Uptake/Biotransfer: Media Concentrations in Water, Soil, Food-chain, Fish, Livestock, Produce, etc.)
  - Ingestion rates (air, drinking water, food, other) used to assess multipathway risks

D. Risk Assessment: Exposure Modeling

- **Multipathway Models** (b) (5) [redacted]
  - Development of Chemical-specific or Category of PFAS chemicals- specific values for each media and route of exposure.
  - Evaluate toxicity to characterize most likely exposure route and prioritize individual PFAS chemicals or categories of PFAS
- **Degradation Chemistry of PFAS**
  - (b) (5) [redacted]

D. Risk Assessment: PFAS Health Effects

Exposure

- Ingestion is the primary exposure route (multipathway)
- (b) (5) [redacted]

Which PFAS are of greatest concern?

- Limited data is available to evaluate exposure, toxicity, and risk
- ORD's toxicity evaluations consider chain length, functional groups, etc.

Health Effects

- Chronic noncancer health effects include effects on development, liver, thyroid, and kidney
- Human carcinogenicity data is limited; there is evidence of carcinogenicity in animal studies (e.g., PFOA: liver and pancreatic tumors; NTP 2020)
- (b) (5) [redacted]
- OAR relies on other EPA program offices for health effects benchmark values
  - Final values for legacy PFAS: PFOA, PFOS (OW)
  - Draft assessments: GenX (OW); PFBS, PFBA, PFNA, PFHxA, PFHxS, and PFDA (ORD)

PFAS Air-Related Research Budget

(b) (5)

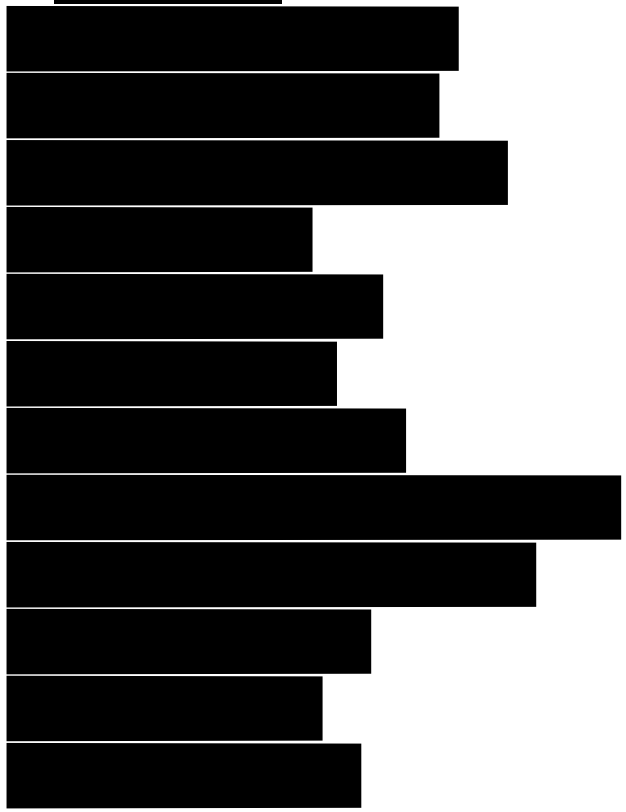
Questions and Next Steps

(b) (5)

Appendix

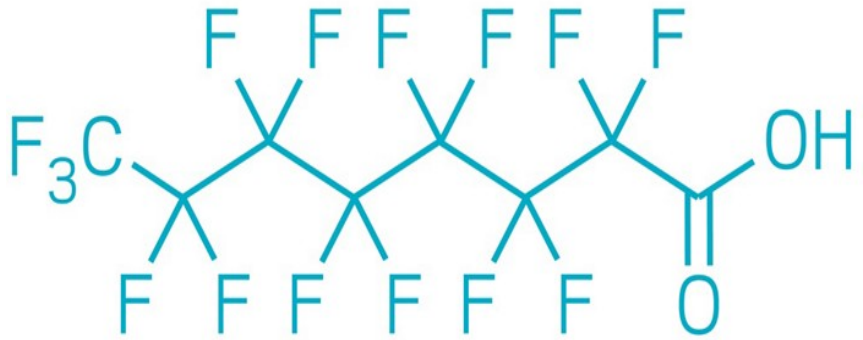
Slides and Presenters

- (b) (5)

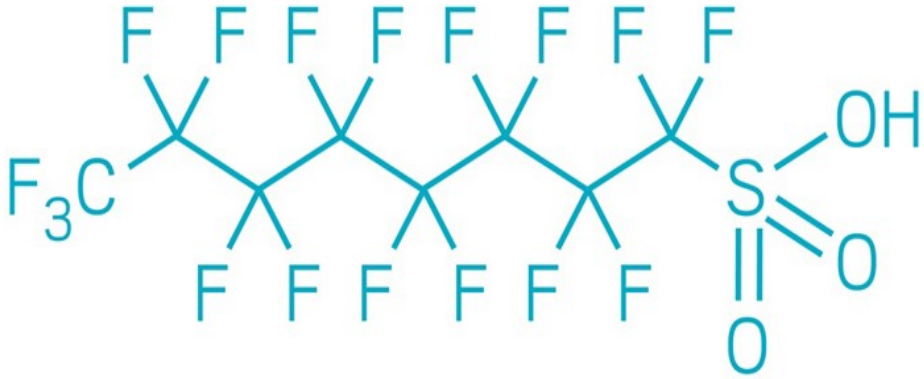


What are PFAS?

- **Man-made** per- and poly-fluoroalkyl substances – chains of carbon (C) atoms surrounded by fluorine (F) atoms
- **Ubiquitous:** Used since the 1940s to make products that resist heat, oils, grease, stains, and water; present in cookware, food packaging, Scotchgard, Teflon; at PFAS manufacturing and processing facilities; at airports and military installations that use firefighting foams (AFFF) containing PFAS
- **Persistent:** C-F bonds do not break down easily. Degradation periods may be years, decades, or longer under natural conditions.
- **Complicated chemistry:** Thousands of different variations exist in commerce
- **Highly mobile:** Easily airborne; can travel long distances in water; are widely distributed in the environment
- **PFOS & PFOA:** Are the most studied PFAS compounds; no longer made in the United States, but chemical manufacturers have replaced them with alternative PFAS, such as GenX.
- **Some** PFAS are known to be PBT:
  - **Persistent** in the environment
  - **Bioaccumulative** in organisms
  - **Toxic** at relatively low (ppt) levels



PFOA



PFOS

NDAA Mandate

- The National Defense Authorization Act for Fiscal Year 2020 (NDAA) was enacted on December 19, 2019
  - (b) (5)

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Statutory Authorities

Congress initially listed 190 hazardous air pollutants (HAPs) in Section 112(b)(1) of the Clean Air Act Amendments of 1990

- Congress also provided for listing new chemicals or substances as HAP or delisting HAPs on the Section 112(b)(1) list, under Section 112(b)(2) and (3)
- Currently, 187 HAP are listed on the Section 112(b)(1) list

Chemicals or substances may be added to the Section 112(b)(1) HAP list

- as part of a periodic review under Section 112(b)(2);
- in response to a petition, or
- based on a determination made by the Administrator under Section 112(b)(3).

  Section 112(b)(2) calls for the Administrator to add a chemical or substance to the Section 112(b)(1) HAP list in response to a "threat of adverse human health effects. . . or adverse environmental effects," while

  Section 112(b)(3) provides for the Administrator to add a substance "known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects"

Section 112(b)(3)(A) requires the Administrator to either grant or deny a petition to list a substance or chemical as a HAP within 18 months of the receipt of a complete petition

Statutory Authorities

There is no specified time where the Administrator acts on his initiative to list a substance or chemical as a HAP under either Section 112(b)(2) or (b)(3)(B).

Section 112(c)(1) directs EPA to identify and list both categories and subcategories of major and area sources that emit HAPs listed in section 112(b)(1) by November 15, 1991

Sections 112(c)(1) and 112(c)(5) allow the agency to periodically revise the source category list acting on

- **the agency's initiative,**
- **in response to public comment, new information and petitions**

  Under Section 112(c)(1) "The Administrator . . .shall from time to time, but no less often than every 8 years, revise, if appropriate, in response to public comment or new information, a list of all categories and subcategories of major sources and area sources" of HAPs

  Under Section 112(c)(5) "the Administrator may at any time list additional categories and subcategories of hazardous air pollutants according to the same criteria for listing" specified in Sections 112(c)(1) and (c)(3)

Section 112(c)(5) requires EPA to promulgate emission standards under Sections 112(d) within two years of listing a new source category that emits one or more listed HAP

Statutory Authorities

Section 112(E)(1)(E) requires EPA to promulgate emission standards under section 112(d) for the regulation of listed HAP from Section 112(c)(1) source categories

- Emission standards that are promulgated under Section 112 are known as national emission standards for hazardous air pollutants (NESHAP) and found at 40 CFR Part 63

The Hazardous Waste Combustors (HWC) NESHAP, set standards for incinerators, cement kilns, lightweight aggregate kilns, liquid fuel boilers, solid fuel boilers, and hydrochloric acid production furnaces. 70 Fed. Reg. 59,402 (October 12, 2005). 40 CFR Part 63, subpart EEE

- (b) (5) [redacted]

The Municipal Solid Waste Landfill NESHAP sets standards for disposal of solid wastes generated from households, industrial and commercial facilities in municipal solid waste (MSW) landfills. 40 CFR Part 63, subpart AAAA

- MSW Landfills are also subject to both Section 111 of the Clean Act and the Solid Waste Disposal Act

Statutory Authorities

Section 129(a)(1) requires EPA to regulate "solid waste incineration units."

- **Note: The term does not include "incinerators or other units required to have a permit under Section 3005 of the Solid Waste Disposal Act." Section 129(g)(1)**
  - **In other words, standards set under Section 129 do not apply to incinerators where hazardous waste is burned**
- **Note: Section 129(h)(2) prohibits EPA from setting Section 112 standards for incinerator units that are regulated under Sections 111 and 129**

Kinds of incinerators that are currently subject to standards promulgated under Section 129 include:

- sewage sludge incinerators (SSIs) at wastewater treatment facilities,
- commercial and industrial solid waste incinerators (CISWI),
- municipal waste combustors (MWCs) and
- Hospital medical and infectious waste incinerators (HMIWI)

Statutory Authorities

(b) (5)

[redacted]

Statutory Authorities – (b) (5)

(b) (5)

Regions

Incineration: OAR is supporting EPA Regional offices and state agencies on technical questions regarding destruction or incineration of PFAS and PFAS-contaminated waste and materials.

- We are in dialogue with Regions to understand the concerns being raised on incineration of PFAS contaminated sewage sludge and we are coordinating with ORD to address these concerns.
- (b) (5) [redacted]

(b) (5) [redacted]

Risk Communication

PFAS risk communication toolkit

- **Goal**: to provide EPA with language and communication tools to explain the human health and environmental risks of PFAS in a way that is meaningful, understandable, and, when possible, actionable
- (b) (5) [redacted]

PFAS Data Explorer (ORD)

- The National PFAS Data Explorer is part of the EPA's cross-agency effort to provide citizens, communities, and organizations with useful information about PFAS.
  - This tool combines multiple data sources, many of which are already public, within a mapping framework so that the user can explore various PFAS data at a national, regional, state, or community level.
  - The Data Explorer will help provide states, tribes, federal partners, and communities the information they need to make informed decisions about PFAS.
  - https://qlikviz.epa.gov/extensions/PFAS_Data_Explorer/PFAS_Data_Explorer.html
- (b) (5) [redacted]